at1201paper: Derivation of Quadratic Formula

Begin with a generalized quadratic equation in standard form.

$$ax^2 + bx + c \ = \ 0$$

Subtract c from both sides.

Divide both sides by a. On the left side, distribute the divisor, and simplify the quadratic term.

Complete the square by adding the square of half the linear coefficient to both sides of the equation.

Factor the perfect square. (Factor the left side of the equation.)

On the right side, distribute the exponent to all three factors of the quotient.

On the right side, make a common denominator.

On right side, combine fractions.

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

Undo the squaring.

Get x by itself.

Distribute the radical over the division in the last term.

Simplify the denominator.

Combine the fractions.